ABSTRACT

A method of separating components having a given negative or positive charge and contained in a sample is disclosed. The method involves, in one embodiment, loading a microchannel with a sample, placed between a trailing-edge electrolyte having a selected concentration of a titratable species, and a leading-edge electrolyte. With the application of a voltage potential across the microchannel, charged components in the sample stack by isotachophoresis, and electrolytic hydroxyl or hydrogen ions formed by electrolysis at the upstream-end electrode migrate into the trailing-edge ion buffer, titrating the titratable species therein, where the concentration of the titratable species in the trailing-edge electrolyte is selected, in relation to the lengths of the upstream channel region and sample-loading volume, to permit the sample to stack into a relatively small sample volume before electrolytic-ion migration from the upstream electrode into and through the sample-volume region is effective to overtake the charged sample components. With continued application of an electric potential across the channel ends, charged sample components in the stacked sample volume separate by zone electrophoresis.